

THE ZOOLOGIST

No. 755.—*May, 1904.*

THE BIRDS OF NORTH KENT.

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UNDER the description of North Kent I would include the tract of land which might be roughly delineated as being bound on the west by a line drawn north and south through Woolwich, on the south by a line drawn east and west through Rochester, and having its remaining boundaries formed by the tidal waters of the Thames and Medway. Considered physically, this district may be divided into marshland and upland, the marshes bordering both estuaries, and the upland, or higher ground, running between them in a fairly continuous range, broken only by the valleys of the Cray and Darent, until it merges with a southward trend into the North Downs.

In considering the bird-life of this district it almost naturally falls into three divisions—those birds frequenting the foreshore, those found on the marshland, and those resorting to the higher ground. These divisions of course overlap, but they will appeal to anyone who is familiar with the country in its ornithological aspects.

Possibly there is no part of the coast of Kent which is less visited by the general public than this, for the estuaries of the Thames and Medway are associated in most people's minds chiefly with the idea of mud, and the flat grazing lands or marsh, bounded almost continuously on the seaward side by a river-

wall, are no doubt lacking in picturesque qualities. And, as a matter of fact, it is perfectly true that at low tide, in both estuaries, there is an expanse of mud and ooze which is far larger in extent than the waters of the then comparatively small rivers, hardly discernible from the shore. But to the observer of bird-life it is scarcely necessary to point out the ornithological possibilities which the stretches of ooze present, possibilities which are often in some measure fulfilled, and would no doubt be more frequently accomplished were it not for the considerable traffic which passes up and down both rivers. And after all, the gently rising upland, with its well-cultivated fields, separated by hedge-rows and scattered elms, is typically English scenery ; while the flat marshland has a charm for some men which it is difficult to describe, and perhaps not altogether easy to account for.

As already stated, a river-wall divides the land and water for the greater part of the coast-line, although there are a few places where the upland rises direct from the shore. It would be interesting to know how long these walls have been built, and the land thus enclosed, reclaimed from the sea. A walscot is levied on the farmers of the district for keeping the walls in repair, the authority for doing so being claimed under an Act passed in the reign of Henry VIII. There seems reason to suppose that the walls nearer London owed their origin to the Romans, and it is presumable that the extension eastward of these defences against the sea was gradual, and spread over a considerable period of time, some characteristics of the marshland also bearing out this theory. Where the margin of the river shelves steeply down, the outer side of the wall is faced with stones, in the cracks and crannies of which Rats are numerous, and in places a few Rabbits are to be seen. In more than one part of this coast-line there are quite respectable stretches of sandy beach, which extend from the wall with a gradual slope until they merge into the ooze of the bed of the river, or sometimes stretch out into long shingly flats reaching some distance into the tideway, and forming pleasant hunting-grounds for a few Oystercatchers (*Hæmatopus ostralegus*), occasionally to be seen there in the autumn and winter months. In other parts there are large areas of salt-marsh, the largest being in the Medway. These "saltings" are curious places, and possibly give one some idea of what the land



now enclosed within the walls was like before they were built. The larger salttings are all intersected and cut up by tidal creeks, and they appear at high tide like so many flat-topped islands, covered with a greyish green vegetation, consisting chiefly of some species of sea-heath. At the seaward edge they almost invariably drop sheer down to the mud, the height varying from two or three to ten or fifteen feet. The cement trade is having some effect on the character of the salttings, especially in the Medway. The clay of which they are formed is a necessary material in the manufacture of cement, and large quantities are annually dug out at low tide, and taken away by barge. This, assisted by miniature landslips taking place occasionally at the spots where the men are digging, has had the effect of forming several large open basins in the middle of the salttings.

Along the outer edge of some of the narrower strips of salt-marsh there are thrown up, in a more or less irregular way, banks of shells and sand, which stand rather higher than the salttings themselves, and at high tide will be dry, while the salting is partly submerged. Some of the banks of shells are also covered at the highest spring tides, but there are a few which can easily be distinguished by the strength of vegetation growing on them, which have evidently not had salt water over them for many years, and the growth of green is fast concealing the sand and shells of which they are formed. A curious feature about these banks is that some of them consist entirely of the shells of the Edible Cockle. There is more than one place in the district where there are (or were, for sometimes the tide washes them away again) deposits of Cockle-shells several feet thick, without a particle of sand or anything else mixed with them. But, as a rule, these banks, locally known as "shelly beaches," consist of broken shells, sand, and a little shingle. The Cockle is the predominant shell, but Mussels sometimes occur in thick beds of smaller area, and there are also always to be seen considerable numbers of a small pink and white, or yellow and white, bivalve (*Scrobicularia alba*), a rather delicate white or yellowish bivalve (*S. piperata*), a large coarse white or brownish bivalve (*Mya arenaria*), and also small Oyster-shells and numbers of Periwinkles. Living specimens of all these shells can be

picked up near the edge of the mud, and live Periwinkles and Mussels are numerous about the stones, where can also be found a few small specimens of the Oyster. It may be fair to assume, that these deposits of dead Cockle-shells point to there having been large colonies of the same mollusc, in such positions, in the bed of the rivers, and that their dead shells were washed up by the tide on to the places where the banks are formed.

Those banks of shells and sand which are deposited on the outer edge of the existing saltings, in the cases where the saltings they are on present a high perpendicular edge to the tide, present a problem to be solved as to how they originally got there. At the present day the ordinary tides may only lap over the perpendicular edge on to the level of the marsh ; a spring tide may just cover the salting itself with a few inches of water, while a spring tide, in conjunction with a strong wind blowing up the river, may make the water wash the top of the lowest shelly beaches. It seems therefore almost certain that since these deposits were made the relative positions of land and water have been altered by a gradual upheaval of the land, and this idea is in some measure confirmed by the fact, already mentioned, of certain portions of the shelly beaches becoming rapidly overgrown with vegetation. I venture also to think that the perpendicular edges of these saltings is a sort of object-lesson in miniature, showing how cliffs are formed by the action of water on the edge of gradually rising land. A more difficult thing to account for, is why the level of the marsh inside the wall should be lower by several feet than the level of the salt-marsh outside the wall, this being certainly the case nearly everywhere.

The wall itself forms a very convenient roadway from which to carry on observations, as from its top can be commanded a complete survey of the marshland on the one hand, and the mud-flats or estuaries on the other ; and it also, upon occasions, forms a useful screen, under cover of which birds can be approached nearer, without alarming them, than would otherwise be the case. And there are many birds which become associated with the vicinity of these walls, though not, properly speaking, shore-birds ; such as the Wheatear (*Saxicola œnanthe*), which is fairly common in the eastern portion of the district during spring and summer, a few pairs also nesting in

holes near the wall, but which is seldom to be seen any distance away from it ; it, in fact, uses the wall as a vantage-ground, flitting along in front of the intruder. A fully-fledged family, last June, were still making use of their nesting-hole as a retreat, long after they were able to fly. In the autumn family parties of old birds and the young of the year are very numerous. The Meadow-Pipit (*Anthus pratensis*) is another bird which seems to have a strong liking for the margins of the salttings, being more common in the winter months, but many pairs nest in the long coarse grass and vegetation which grows on the banks of the wall, and their short song and curious flight in spring time and summer quickly associates itself in one's memory with walks along this coast-line.

The Rock-Pipit (*Anthus obscurus*) is also a common bird in the autumn and winter, but not to be seen except in close proximity to the shore, and, in fact, one might almost say that it keeps religiously to that side of the wall nearest to the tideway. In the winter Linnets (*Linota cannabina*) seem to find food of some sort amongst the vegetation of the salttings which is evidently to their liking, for numerous small parties of these birds are almost always to be seen there. The Hooded Crow (*Corvus cornix*) is a very common bird all through the autumn, winter, and early spring ; as also is the Carrion-Crow (*C. corone*), all the year round, in a more inconspicuous way. A walk in winter along the wall will generally disturb more than one party of the first-named birds, and a pair or two of the latter, holding *post-mortems* on various subjects of interest to them amongst the wrack of the tide. The earliest date I have noted of seeing the Hooded Crow in the autumn is Oct. 21st, 1900, and the latest date in spring is April 21st, 1900 ; but a closer observation than I am able to keep would no doubt give more exceptional dates. It is a common sight to see both the Hooded and Carrion Crow feeding out on the mud-flats, amongst Gulls and other birds, at low tide.

It strikes one rather by surprise to see a Kingfisher (*Alcedo ispida*) flash past on these salt-marshes. Curiously enough, two of my notes of this bird fall within a day of each other in consecutive years—Nov. 16th, 1902, and Nov. 15th, 1903 ; but I have also several notes of them about the land-marshes at the same time of the year—November and December. Upon one

occasion only—Jan. 31st, 1903—I followed and watched a flock of fifteen Snow-Buntings (*Plectrophenax nivalis*) feeding in the grass on the river wall. When flying away the white feathers in the wings and tail were so conspicuous as to make them appear to be almost entirely white. The note they uttered when flying was something like the twitter of a Greenfinch.

In the winter months there are generally large mobs of Ducks to be seen on the Thames. For the greater part they consist of the Wild Duck (*Anas boscas*), but I have also distinguished at various times the Common Sheld-duck (*Tadorna cornuta*), the Pintail (*Dafila acuta*), the Teal (*Nettion crecca*), the Wigeon (*Mareca penelope*), and occasionally the Common Scoter (*Oidemia nigra*) and the Scaup (*Fuligula marila*) ; and on one occasion (February, 1904) I saw a small mob of Wild Geese flying over from the Thames in the direction of the Medway, but at too great a distance for me to be able to distinguish the species. The Ducks are kept continually on the move by passing craft, and are in consequence wild and shy, and not easy to get near ; but, concealed by the wall, I had the good fortune to watch for some time (February, 1904) a large flock of fully two hundred Sheld-duck, with a small flock, on the landward side of them, of about thirty Pintail. They all floated past within a distance of thirty yards (it was high tide at the time), across a little inlet which rejoices in the name of Egypt Bay. The Sheld-ducks were rather noisy, continually uttering a cackling note. One of them noticed my head over the bank, and instantly gave the alarm, with the result that all the mob were soon on the wing, flying out towards the middle of the river.

The Waders are naturally the most common birds to be seen on the mud-flats of these two estuaries. Amongst passing visitors are the Dotterel (*Eudromias morinellus*), and the Turnstone (*Strepsilas interpres*), of both of which species one generally sees a few along the margin of the tide during the spring and autumn migrations, the Turnstone more frequently than the Dotterel. The Grey Plover (*Squatarola helvetica*), and, as already mentioned, the Oystercatcher (*Hæmatopus ostralegus*), are to be seen occasionally during the winter on the mud-flats ; the Golden Plover (*Charadrius pluvialis*), although sometimes seen on the shore during the same season, is more common on the upland,

often in company with large flocks of Lapwings (*Vanellus vulgaris*). The Dunlin (*Tringa alpina*) is to be seen in more or less large flocks all the year round, in the spring and summer with the dark band on the breast ; and Curlew (*Numenius arquata*) and Whimbrel (*N. phaeopus*) are also nearly always to be seen or heard all the year round, either on the mud-flats or salttings, Curlew being more numerous of the two.

Of all the Waders, however, the Redshank (*Totanus calidris*) is the most numerous, and, although distributed all over the marshland during the nesting season, it confines itself almost entirely to the mud-flats and salt-marshes during the autumn and winter. A little manœuvring behind the river wall, will often enable one to watch small flocks of these birds, feeding on the oozy bottom of the creeks, and channels of the salttings. They run rapidly as they feed, occasionally taking short flights, trying to get ahead of each other, continually probing the mud with their bills, not hesitating to run breast-deep into the water, and every few moments uttering a soft low whistle. They are more difficult to approach at high tide, when all but the highest parts of the salttings are submerged. These high places they choose to rest on, and however careful the watcher may be, he will hardly have got his head above the level of the top of the river wall before he is greeted by the shrill alarm-note—a sort of double whistle—of one of these birds, which he will probably see flying straight towards him, as though to investigate, then circling round, often quite close to the water, with rapid and powerful strokes of the wings, sounding its alarm-whistle all the time, and effectually arousing any birds in the near neighbourhood. In a minute or two it will settle on another piece of land, raising its wings straight over its back before folding them into their places ; and, after bowing its head two or three times in different directions, it will subside into quietness until disturbed again. This bird has a trick of bowing its head in this way ; it will stop in the middle of feeding to do so, the bow being often, but not always, accompanied by a whistle. In a walk through these salttings at low tide, requiring to be done with some circumspection, on account of sticky mud, and creeks which need negotiating, one will surprise many parties of these birds, and Dunlins, feeding along the smaller channels. Their shrill alarm-

notes will often be accompanied by the deeper and more subdued whistle of the Curlews feeding farther out on the flats.

The Ring-Plover (*Egialitis hiaticula*) is to be seen along the coast all the year round, and nests on the shelly beaches; but of this bird, and its life in the district, more anon.

Of the Tern family, the Lesser Tern (*Sterna minuta*) nests on the shelly beaches, and the Common Tern (*S. fluviatilis*) is to be seen in small numbers during the late summer; and I have one note (Aug. 9th, 1902) of a Black Tern (*Hydrochelidon nigra*), which I watched for some time beating up the Thames about thirty yards from the river-wall.

All six species of British-breeding Gulls frequent the district, and are often to be seen in large mixed flocks in the winter, and in smaller flocks in the summer. The Common Gull (*Larus canus*) and the Black-headed Gull (*L. ridibundus*) are the commonest, the latter scarcer in summer; large flocks of mature Lesser Black-backed Gull (*L. fuscus*) are occasionally to be seen, but the Herring-Gull (*L. argentatus*), the Great Black-backed Gull (*L. marinus*), and the Kittiwake (*Rissa tridactyla*) are not numerous. The mixed flocks of these birds are generally largely composed of immature examples.

I have watched Divers from a distance on the Thames (March, 1904), but too far off to be able to identify them, except that by the light and dark throats it was fairly clear that there were male and female present; probably from their size, as compared to Wild Ducks, amongst which they were swimming and diving, and whom they seemed to be considerably disturbing, they were specimens of the Red-throated Diver (*Colymbus septentrionalis*).

My only acquaintance with the Guillemot (*Uria troile*) in this district consists of a frozen corpse which I found on the landward side of the wall about ten miles up the Thames (Dec. 27th, 1901).

From the foregoing notes it will be seen that the only shore-birds which breed along this coast-line are the Ringed Plover and Lesser Tern. A chance Redshank or Lapwing may occasionally lay its eggs to the seaward side of the wall, but the pasture-lands and the margins of the fleets in the so-called marsh are their stronghold.

The Ringed Plover's year in this district might well be

divided into halves—the one from the beginning of September to the end of the following March, when its gregarious habits prevail, and it is to be seen in flocks of various sizes round the coast ; the other from the beginning of April to the end of August, when it frequents the shelly beaches in numerous pairs, and is occupied with the work of bringing up its young. Any day in the autumn or winter one may notice small parties of these birds searching for food over the mud-flats, generally in the more open parts of the coast, but also occasionally along the narrow creeks running through the salttings. They often join forces with flocks of Dunlin, and, as a rule, in these mixed flocks the Dunlin predominates ; but upon many occasions one will see very large flocks consisting entirely of Ringed Plovers. It is to be found at this season up the Thames to within six miles of Gravesend, and up the Medway to within four miles of Rochester, but it is more numerous in those parts of the coast which reach nearest to the open sea.

Towards the end of March, however, a walk along the shelly beaches, which the bird does not frequent much during the winter months, will show that they are already beginning to seriously think of the business of nesting. They will be seen at this time of early spring in numbers, playing on the beaches, although not yet separated into pairs ; the male birds indulge in fantastic twisting flights, accompanying their movements with a rolling whistle, which might well be described as a rapid repetition of their ordinary call-note, with a slurring of one note into another. This whistling song is not heard except during the breeding season, and then only while the bird is in flight. At this early date the birds are more numerous than later on, but all through the season there are a certain number of non-breeding birds present about the beaches ; and during this season also one often sees them feeding on the land, and by the edges of the fleets, a thing which one never notices in the winter months.

The earliest date on which I have found nests with eggs in them is May 10th. On that date, in 1903, I found four nests containing respectively one, two, three, and four eggs. In the case of the nest containing four eggs, laying would probably have commenced at least a week earlier ; and in the case of several nests I found hatching out towards the end of May of the same

year, the first eggs must have been laid during the first week in the month ; and with several nests found in 1902, calculating back from the date of hatching out, the commencement of laying would also be the first week in May. Other nests found, in which the first egg was laid towards the middle of June, were probably second broods, though this it is hardly possible to prove.

The laying of eggs in individual nests seems to take place at irregular periods. Thus a nest found containing one egg on May 10th, 1903, had only three eggs in it on May 16th. A nest found on June 12th, 1903, with two eggs in it, had the third egg laid on June 14th, and the fourth egg not until June 17th ; but wet and cold weather had intervened in both these cases, and no doubt influenced the birds. The latest date at which I have found fresh eggs was June 28th, 1902, a nest containing four eggs being found on that date, and one being blown to test the freshness proved them to have been quite recently laid.

I have never had sufficient time at my disposal to be able to watch closely the history of one nest right through, but incubation must occupy fully nineteen days, for a nest found on May 31st, 1903, contained as a full clutch only two eggs, which did not hatch out until June 18th ; but, not having had the nest under observation previous to May 31st, I was ignorant as to when the bird began to sit.

It is fair to assume from these notes that the Ringed Plover takes at least a week to lay its clutch of four eggs, the interval between the layings being in some cases as much as three days. Of course the hatching of the eggs is not spread over such a period of time, according to my experience extending only over about twenty-four hours. A nest found on May 31st, 1903, contained four eggs, in which the young birds could be distinctly heard tapping on the shells. Visiting this the next day, I found that two of the chicks had already left the nest, and were nowhere to be seen ; the third chick was crouching near the nest quite strong and lively, and able to run ; while the fourth was still in the nest-hollow, quite wet, having evidently not long got free of its egg-shell, and too weak yet to stand up. Notwithstanding the evident very recent hatching of this chick, I could find no trace of egg-shells near the nest. In another instance, a nest first found on May 31st, 1903, with a full clutch of four eggs, had

one egg hatched out early on June 7th, the other eggs not being then even chipped, nor were they before sun-down on that day. But the next morning there was only one egg left in the nest, which proved to be an infertile one.

I had hoped that this last nest would have given me the opportunity of proving the truth of the statement, sometimes made, that the old bird removes the pieces of egg-shell from the vicinity of the nest when the chicks are hatched. On June 7th, when I found the one chick hatched, as already mentioned, one-half of the egg-shell was lying in the nest-hollow, and the other half close to it. The character of the ground enabled me to conceal myself within fifteen yards of the nest, and so effectually, that the bird was very shortly back on its eggs. It took no notice of either of the pieces of egg-shell. After it had been settled on its eggs a few moments, it stood up in the nest and shuffled the eggs and young bird in what seemed to be a very rough manner with its wings and feet. It then settled down again, and remained quite still, except for keen alert movements of its head, until disturbed by some children coming over the top of the sea-wall. But in the meantime the wind had done what the bird is supposed to do, and the half egg-shell outside the nest was blown to a considerable distance, while the second half still remained in the nest-hollow. Late in the afternoon this other half had also disappeared; and the following morning, when all but one egg were hatched, there were no egg-shells to be seen near. Judging from my own experience of the very breezy spots which these birds choose as nesting sites, it would be scarcely necessary for the old bird to do more than kick the egg-shell out of the nest, when in all probability the wind would do the rest.

The latest date at which I have handled nestlings was Aug. 4th, 1901, when I caught and examined a brood of four, still covered with down, and showing no sign of quill-feathers. In describing the markings of the Ringed Plovers' nestlings in 'The Zoologist,' 1903, p. 222, I was perhaps not quite accurate in saying that there was no sign of the black pectoral band. From numerous examinations of these downy nestlings during the spring of 1903, I would correct this description by saying that there *is* the commencement of this band in the shape of

two small black patches on each side of the body just where the carpal joint of the wing folds against the breast. Arguing from this, according to the laws usually laid down by evolutionists, we may fairly suppose that at one time the adult Ringed Plover had not the complete black band across its breast, but a broken band, after the fashion of its near relative, the Kentish Plover (*Aegialitis cantiana*) ; and that, as this condition of marking still shows itself in the first plumage of the young Ringed Plover, the alteration of the plumage of the adult from a broken to the complete pectoral band has taken place at a comparatively recent date—recent from the point of view of the evolutionist. It is interesting in this connection to remember that the adult Kentish Plover has the band incomplete ; the nestling Ringed Plover has it incomplete, while the adult has it complete ; and the Lapwing, nestling and adult, both have the completed black band. I have referred to all the ornithological works at my disposal as to the plumage of the Ringed Plover in its first year, and they all say it has a brown band across the breast. On August 9th, 1903, I was watching a flock of twenty of these birds, amongst which were two which had *not* a complete band, but small black patches on either side of the breast in the same position as in the case of the nestling, the middle of the breast being white. These two birds had also no black markings on the head, and were therefore certainly birds of that year.

I have kept a record of nineteen nests of these birds found on the shelly beaches during the last three seasons. Out of the nineteen there were two in abnormal positions. One of these was a scratch-out in the earth at the base of the river-wall, and was separated by about one hundred yards of salt-marsh from the beach, the nest-hollow being quite thickly lined with the leaves of the sea-heath growing on the salttings. The other was scratched out by the side of a road, made up of cinders and household refuse, running across one of the salttings. This also was some distance, two hundred yards, from the beach, and the nest-hollow was paved entirely with small pieces of earthenware, evidently picked off the track on which the nest was situated. The remaining seventeen nests were all on the beaches, within a few feet of high-water mark ; but five of them were made under the shelter of little bushes of sea-heath—which grows on

the beach in small clumps to the height of about twelve inches—the nest-hollow being so much under the edge of the bush as to be partially concealed and shaded by its stems; the remaining twelve nests were in the open exposed parts of the beach. Of these seventeen nests, I also noticed that seven were distinctly and without doubt paved with small pieces of broken shells, the rest being just bare hollows scratched in the sand. The normal nest therefore would appear to be a bare hollow scratched out in the most exposed portion of the beach. Do both these lined, and partially concealed, nests point to a gradual alteration in the habits of this bird in the direction of a more specialized nest?

The colony of Lesser Terns which I have had under observation now for three successive seasons—it is pleasant to be able to say so—seems to be increasing in numbers. The birds make their appearance in April, being then seen in small parties fishing along the coast and creeks in the vicinity of their nesting ground. The earliest date on which I have a note of them is April 20th, 1902; but I do not give this as the date of their arrival, because my observations have not been continuous enough to fix that date; although during a visit to the beach on April 14th, 1903, I saw no signs of them, and should therefore be inclined to put the date of their arrival as somewhere between April 14th and 20th. They do not congregate on the beaches where they nest until towards the middle of May. On May 20th, 1903, I found them in numbers on their own particular stretch of beach, and I was rather surprised to find two nests with one egg in each: this is the earliest date at which I have found their eggs. From the first start of laying, I am of opinion, that any day one would be able to find fresh eggs, and eggs in all stages of incubation. The only eggs I have taken from this colony have been acquired simply with a view to testing the times of laying. Thus, an egg from a nest containing three, taken on May 26th, 1901, was so hard sat that I could hardly blow it. (This would put the first laying for this nest earlier than May 20th.) At the same date an egg from another nest was perfectly fresh. On June 18th, 1903, I found a single egg which I thought had been laid since a visit on the previous day, and upon blowing it my surmise proved to be correct. On June 28th, 1902, a single egg laid in a nest proved to be quite

freshly laid, as did also an egg apparently laid by chance on the beach. At the same time—June 18th, 1903—I handled nestlings just hatched out; and on June 28th, 1902, I caught nestlings beginning to flutter over the beach which had the primary quills quite long. At such a late date as the end of June it is no criterion of freshness to see only one egg in the nest, as it simply means, in most cases, that the other eggs are hatched and the chicks away. What often has astonished me is how seldom one notices the young nestlings after they have once left the nest-hollow, although there must often be numbers crouching on the beach.

The main colony is crowded on to a piece of beach a hundred yards long; but there are also a few smaller detached colonies, which make the nesting range of the bird stretch for quite two miles along the coast. In the main colony the nests are astonishingly close together, and are often intimately associated with nests of the Ringed Plover. There are so many nests that it is difficult to keep any clear record of them, but in June, 1902, I jotted down a plan of a small part of the beach (about forty yards long by fifteen yards wide), on which I had marked thirteen Lesser Terns' nests, and two Ringed Plovers' nests, all with eggs or young in them. From notes made during that spring I was able to fix the length of incubation at about twenty days, as a nest found and marked on May 26th with two eggs in it, contained two nestlings just hatched on June 15th. From this and foregoing notes one might expect to find young nestlings in the first week of June. The earliest note, however, of nestlings which I have is on June 12th, 1903, on which date I found four nests with young in them. The wet weather had played sad havoc with them, as three of the nestlings were dead. The same cause might account for slow hatching out in one of these nests. This contained one nestling and one egg on June 12th, and the second nestling was not hatched until June 14th, both being in the nest-hollow on that day, the recently hatched one being only three-quarters the size of its elder brother. In 1902, towards the end of June, and fine warm weather, a nest found on the 27th of the month with one chick and two eggs, on the early following morning contained only one egg, both nestlings that were hatched having already left the nest. Some of the young

which I measured as they lay in the nest-hollow (they generally lie quite flat on the ground with the head stretched out in front) were from $2\frac{1}{4}$ in. to $2\frac{1}{2}$ in. long. The colour of the down above is a sandy yellow, stippled with black, forming black streaks. The under side is pure white. The feet and legs are a pale pink flesh-colour, and the beak pinkish horn at the base, and black towards the tip. A bigger nestling caught running on the beach measured $3\frac{1}{2}$ in. long, and had the sandy yellow down of a darker shade, and the legs and feet of a redder pink. Another, measuring 4 in. long, had the primary quills well developed.

A curious feature about some of the nest-hollows made by the Lesser Terns on this beach is that they are most carefully lined with pieces of white Cockle-shell. I have never noticed, either on Dungeness Beach or any other district where I have examined Lesser Terns' nests, the slightest approach to a lining of any sort. And it is only exceptional, I think, even on this beach. A typical nest of this description has the shells spread in a circular patch, somewhat larger than the actual hollow in which the eggs are laid, and heaped up round the edges of the nest, so as almost to form a little circular bank. The measurements of such a nest found on May 26th, 1902, proved the hollow to be $\frac{3}{4}$ in. deep and 4 in. in diameter, while the patch of broken shells measured $5\frac{1}{2}$ in. in diameter; and on the same day I examined two other nests made after the same pattern. Later in the same season I found four nests which were only partly lined with broken shells, giving the idea that the shells had been spilled, as it were, on to one segment of the nest-hollow; and on the same date I found several nests with no shell-lining at all. In one day spent on the beach in 1901 towards the end of May, out of four nests examined, three were lined all over with the broken Cockle-shells. In the spring of 1903, however, there seemed to be a marked scarcity of shell-lined nests, as out of some twenty to thirty nests examined, only two had a shell-lining extending over the edges of the hollow, as described above. The lining of shells is so thick, that in 1903 I could distinctly see the remains of a nest I had marked the previous spring. As may be imagined, a thick patch of white Cockle-shells is quite the reverse of an assistance in concealing the eggs from sight—at any rate, from the sight of a human being.

The number of eggs laid is of course usually two or three, but I have one note of a nest found on June 12th, 1903, with four eggs in it, which showed such strong resemblances to each other as to leave little doubt that they were all laid by the one bird. I have found that the markings of the eggs laid in this colony vary much more than do those of eggs found on Dungeness Beach. In the latter district the majority of the eggs have a sandy ground colour, with both the underlying and surface spots more or less minute, almost approaching in fineness the spots on the eggs of a Ringed Plover; and there is also a variety to be found on Dungeness Beach in which the ground colour is a creamy white, and the spots are nearly black, and almost large enough to be called blotches. This last variety is much more common on the North Kent beaches, but the variations of both the ground colour and the markings show many more grades between the two types. One might almost say that the ground colour ranges from a pale blue, through white, creamy white, and sandy, to a brown, almost as deep as some Gulls' eggs; and the markings from small spots to large blotches, more than half an inch in diameter, similar in character to those often seen on Sandwich Terns' eggs. One abnormally coloured clutch looked remarkably like eggs of the Mistle-Thrush, one of them being of a delicate blue ground colour, with only two spots. I will confess that this clutch found its way into my cabinet.

I have often wondered whether the instinct of these birds is ever at fault as to the positions in which they place their nests with regard to the tide. In one instance I found a nest, on June 1st, 1902, with the bird sitting on three eggs, on a spot which at some time during the following fortnight was swept by the tide, the small piece of beach having been washed right away, leaving the bare clay exposed. When I first found this nest the bird was so keen on returning to its eggs that it settled on them while I was sitting on the beach with a friend in full view, and not fifteen yards distant. It is therefore probable that the eggs were then in a forward state of incubation, and, if so, were possibly hatched out before the tide came over the place. At Easter of 1903 there was a very high spring tide, backed up by a strong easterly wind, when only very narrow strips of the highest parts of the beach were above water. If

there had been such a tide as this during the nesting season, many of the nests on the beach would have been covered. May 10th was the next spring tide, but on that date there were few eggs laid, and there were no signs of the water having been so high as in April. At the spring tide in June the beach was full of nests, but the tide did not reach the level of April, and I was on the beach myself on this occasion, and found that, although the water came within a foot or two of many nests, there were none in danger of being washed away.

The Little Terns are most interesting birds to watch. Their flight is both graceful and powerful. When fishing along the creeks or ditches, they will often come close to a quiet observer. They then fly quite slowly, and every stroke of the wings can be seen to actually lift the bird's body as it propels it forward. Its beak is pointed downwards at right angles to the horizontal centre line of its body, and one can see it turning its head from side to side scanning the water for food. When it catches sight of anything, it will hover like a Kestrel, with rapid wing-beat, and the tail spread wide, assisting it to maintain its stationary position. This hovering seems to serve a double purpose of enabling the bird to make sure that there is something worth plunging for, and also to get itself into the right position with reference to the object it wishes to secure; and I have often seen them work themselves *backwards* several inches when hovering in this way. As soon as it has decided that there is something worth catching, it drops head first, with half-closed wings, perpendicularly into the water, the head and shoulders disappearing underneath, and only the tips of the wings and tail showing above the surface. They generally sit on the water for a moment before taking flight again, and occasionally swim about for a minute or two. But, as a rule, they do not waste much time before again beating along over the water.

The beach on which they nest can hardly be passed by in ignorance during the nesting season, for as soon as an intruder comes within a certain distance every bird rises off the beach. The majority fly straight out to sea, but some few come towards the visitor, uttering all the time their chattering call-note. The probabilities being that there are a certain number of birds attached to the colony not engaged in nesting operations, as a

large number always rise in a flock from parts of the beach exposed by the tide, while those sitting on nests rise one by one at intervals from the part of the beach on which the nests are situated. By concealing oneself at a moderate distance, the birds can be watched returning to their nests. First one bird will fly back to the beach, and beat backwards and forwards over it, being joined shortly by many others. A few moments' hovering over certain spots by individual birds will give the observer some inkling of where the birds will eventually settle on their eggs. But there is much hesitation, the hovering being many times repeated, the bird sometimes dropping to within a few inches of the beach, and yet rising again. Then finally one bird, after a moment's hovering, will drop down right into the nest-hollow, just steadying itself with its wings as it reaches the beach, then folding its wings, settles itself on its eggs. One by one others will follow the example of the first, and by degrees the beach will regain comparative quiet. It is almost an unbroken rule for the bird to settle right in the nest-hollow, but on two occasions I have noticed a bird settle far enough away from the nest to entail the necessity of walking a few steps to get on to the eggs. The beach does not remain quiet long, as a good deal of quarrelling takes place amongst the mates of the birds sitting on the eggs as they bring in food. And birds will chase each other all over the beach, often disturbing those on the eggs. Or a Ringed Plover will occasionally come too close to a Tern sitting on its eggs, and either it or its mate will fly at the intruder with angry chattering, and drive it away. Later in the year one may watch the old birds feeding their young ones, and it is noticeable then that both the old and young Terns are fairly active in running over the beach; but not to be compared in this respect with the Ringed Plover. As far as I have been able to make out, but on this point I am not quite certain, the feeding is done by the old bird dropping whatever morsel it is carrying into the young bird's widely opened beak. A large Gull or a Crow passing overhead will be a signal for a number of the birds to dart out and drive it off; and a very lively time it has from the absolutely fearless attacks of its small tormentors until it gets well out of bounds. I cannot imagine that any birds can do much harm to the colony in the way of stealing eggs; but a

large Grass-Snake which I one day found making its way along the beach might be a more dangerous enemy.

By the first week in August the beach itself will be deserted, but feeding along the coast, or sitting on the beaches not far from the nesting sites, the whole colony, young and old, will be found collected into one flock. They are then often seen flying in regular formation, such as is adopted by the Dunlin and Golden Plover. They will also occasionally have associated with them other species of birds. Last year (1903), early in August, I saw a mixed flock consisting of about one hundred and fifty Lesser Terns, thirty or forty Ringed Plovers, as many Dunlin, still with dark breasts, a dozen or more Common Terns, and half a dozen Turnstones. It is at this season that one can get some idea of the number of birds in the colony, and my estimates for the last three years were, approximately, eighty birds in 1901, one hundred to one hundred and twenty in 1902, and one hundred and fifty in 1903.

BIOLOGICAL SUGGESTIONS.

RIVERS AS FACTORS IN ANIMAL DISTRIBUTION.

By W. L. DISTANT.

(Concluded from p. 133.)

Part II.—DISTRIBUTIVE ACTION.

If rivers have proved barriers to the distribution of animals in one way, they have also assisted in another manner to the dispersal of much animal life. As Heilprin has well remarked : "In regions like the tropics, which support a luxuriant vegetable growth, and which are subject to periodical overflows, and, consequently, to the uprooting or outwashing action of the inundating waters, it not infrequently happens that islands or 'rafts' of considerable magnitude, consisting mainly of interlaced or matted vegetation—tree-trunks held together by various creepers and climbers, and containing a sufficient quantity of vegetable mould and soil bound together in the roots—are floated down stream into the open sea, where they are at once placed at the mercy of the prevailing oceanic and atmospheric currents."* Many such occurrences have been detailed by competent observers, and have not been confined to the tropics.† We can scarcely over-estimate the amount of animal life contained in this mighty flotsam and jetsam. The northern coast of Spitzbergen is covered with immense accumulations of driftwood, which has been pronounced by botanists to be nearly all Siberian larch, brought by ocean currents from the mouths of the great

* 'Geogr. and Geol. Dist. Animals,' p. 44.

† Similar floating islands are found on lakes. Capt. Gilliss states that before Lake Taguataga in Chili was drained there were in it islands composed of dead plants matted together to a thickness of from four to six feet, and with trees of medium size growing upon them. These islands floated before the wind, "with their trees and browsing cattle" (*cf.* Marsh, 'Man and Nature,' p. 350, note).

Siberian rivers.* This driftwood is some of that which the Lena and other rivers carry into the sea every spring.† Benkendorf, a young Russian engineer, employed by the Government in a survey of the coast of the mouth of the Lena and Indigirka, was despatched up the latter stream in 1846, and communicated the following account of his experiences in a letter to a friend in Germany :—" In 1846 there was uncommon warm weather in the north of Siberia. Already in May unusual rains poured over the moors and bogs, storms shook the earth, and the streams carried not only ice to the sea, but also large tracts of land, thawed by the masses of warm water fed by the southern rains. . . . The river rolled against us trees, moss, and large masses of peat, so that it was only with great trouble and danger we could proceed."‡ Similar is the action of our own Tweed, when after a week's rain it comes down "in its might, and every tributary stream, transformed for the nonce into a river," swells the mighty flood. "Then timber trees, sawn wood, dead animals, farming implements, even haystacks," come floating down, and the very channel of the river is diverted, sometimes never to return to its ancient course.§ On the floating islets of the Mississippi "young trees take root, and the water-lily or nenuphar displays its yellow flowers; serpents, birds, and the Cayman Alligator come to repose there, and all are sometimes carried to the sea, and engulphed in its waters."|| Not, however, always engulphed, for the sea sometimes casts up more than her dead, an instance of which is recorded by Guilding at the island of St. Vincent: "A noble specimen of the 'Boa Constrictor' was lately conveyed to us by the currents, twisted round the trunk of a large sound cedar tree, which had probably been washed out of the bank of some great South American river, whilst its huge folds hung on the branches, as it waited for its prey. The monster was fortunately destroyed after killing a few sheep."¶ The South

* Cf. Ripley and Dana's 'Amer. Cyclopaedia,' vol. ii. p. 77 (1874).

† Cf. Laughton, 'Phys. Geogr. in Relation to prevailing Winds and Currents,' p. 207.

‡ Cf. W. Boyd Dawkins and H. W. Oakley, 'Cassell's Nat. Hist.' vol. ii. p. 289.

§ "The Autobiography of a Salmon," quoted by J. Watson, 'Poachers and Poaching,' p. 165.

|| Cf. Lyell, 'Principles of Geology,' vol. ii. p. 365.

¶ Ibid. p. 369.

American travellers Spix and Martius assert that on different occasions they observed "Monkeys, Tiger-cats, Squirrels, Crocodiles, and a variety of birds" carried down the stream of the Amazon on such floating masses, and similar observations have been made by other travellers on the Rio Paraná. It is asserted that no fewer than four Pumas were landed in one night from such rafts in the town of Monte-Video.* Mr. Rodway describes the blocking of the Guiana rivers with the monster arum (*Montrichardia arborea*), and floating island-grass (*Panicum elephantipes*), which in dry weather, when the water is low, and the stream has little power, "meet in the centre, and close the passage-way for a time, only, however, to be torn away in great masses as the floods come. At such times great patches, fifty feet or more in diameter, are seen floating down-stream, sometimes carrying with them monster Camoudies (*Boa murina*), or other snakes. Sometimes a great tree, whose timber is light enough to float, gets entangled in the grass, and becomes the nucleus of an immense raft, which is continually increasing in size as it gathers up everything that comes floating down the river."†

From the East we frequently read the same story. Lord George Campbell relates that when the 'Challenger' was steering for Humboldt Bay—"For the last two days we have been passing quantities of driftwood, so thick and heavy last night, that we had, for fear of the screw, now and then to stop. . . . All this heavy driftwood must have been swept here by rivers, probably swollen now, as it is the wet season in New Guinea."‡ Floating masses of wood, with upright trees growing on them, were mistaken by Admiral Smyth, in the Philippine Seas, for true islands, until their motion made their real nature apparent. On the coast of Borneo, when sailing for Kuching, Mr. Boyle found "a huge tapong-tree quite eighteen feet in diameter and eighty feet long, hanging and jarring" against the side of the vessel. The same day he saw a "floating island; the phenomenon is not uncommon in tropical latitudes, and its principle of locomotion is found to be simple enough when properly investigated. Some

* Heilprin, 'Geogr. and Geol. Distr. Animals,' p. 44.

† 'In the Guiana Forest,' pp. 107-8.

‡ 'Log Letters from the Challenger,' 2nd edit. p. 272.

giant tree upon a river-bank is carried away by a sudden inundation, and floats upright out to sea, supported by the mass of earth in the clasp of its widespread roots. When the soil melts away the tree is subverted with a crash, the island disappears, and a naked log drifts too and fro upon the waves."* Mr. Hickson may be quoted for Celebes: "During the heavy rains of 1882 the Manado River brought down vast numbers of mighty forest trees, and many of these must have drifted out to sea with a very considerable crew of Squirrels, Mice, caterpillars, and other animals."†

The distribution of plants is also largely influenced by the action of rivers, and many species are thus dispersed which would have scarcely any wide distribution by other means. On the banks of rivers and streams, "a portion of the plant-fragments brought by floods and stranded on the mud of calm inlets undergoes decomposition. A larger portion remains fresh and living, sending out roots and vigorous shoots. In the bed of the Danube, in addition to the abundant creeping shoots of the reeds (*Phragmites*), and various sedges, bulrushes (*Scirpus*, *Typha*), broken twigs of *Salix fragilis*, bits of root of the seabuckthorn (*Hippophae rhamnoides*), and fragments of the rhizomes of *Cenanthe phellandrium* and *Acorus calamus*, leafy twigs and stolons of various species of pondweed, water-milfoil, and water-ranunculus (*Potamogeton*, *Myriophyllum*, *Ranunculus aquatilis*) are all distributed in this way. Sometimes these growths settle in places where formerly no specimen of the kind had been seen for miles, and the fact may be easily confirmed that the distribution of their offshoots is actually brought about by flowing water in a very short time to great distances and in great abundance."‡ In the Malay Peninsula, *Hodgsonia heteroclita* frequents dense thickets on river-banks. It bears very large woody gourds, covered with a grey pubescence. These gourds drop from the plant when ripe, and float in the river. The pubescence prevents them from injury by wet, so much so that a gourd may be plunged in the water and taken out again dry. The seeds, too, are large and woody; they float in water, and are protected from

* 'Advent. among the Dyaks of Borneo,' p. 135.

† 'A Naturalist in North Celebes,' p. 190.

‡ Kerner and Oliver, 'Nat. Hist. Plants,' vol. ii. p. 808.

injury, as the pulp of the fruit is exceedingly oily. "This is an example of modification for dissemination by water."*

Even rivers influence the route of bird migration. Prof. Mosso, from an examination of a map illustrating Palmén's law of bird migration, states "that the birds follow by preference the great river valleys and the shores of sea and ocean. One of the most frequented routes in Europe is the valley of the Rhine as far as Switzerland. It is round the Swiss lakes, indeed, that the greater number of northern birds are found. To go to Africa, they pass the Lake of Geneva and the Mediterranean by the valley of the Rhone. Here the route divides, and the birds reach their destination by either the Italian or the Spanish coast-line."†

Part III.—RIVERS SWAM BY LAND ANIMALS.

But though rivers may at the present time—and undoubtedly did in the past—prove a barrier to animal distribution, and especially to that of mammals, still, as might be expected, many mammals and other animals, including some of the least suspected, have from time to time been observed to cross wide and swift rivers, and have moreover apparently inherited a tendency to do so, which has subsequently developed into a somewhat fixed habit. As an example, the Tiger may be adduced as an animal not only known to cross rivers, but even to swim across an arm of the sea, as the Singapore Strait, which is more than a mile in width. According to Mr. Ridley, "they habitually swim over to Singapore, across the Johore Strait, usually by way of the intermediate islands of Pulau Ubin and P. Tekong. They make the passage at night, landing in the early morning. As so much of the coast is mangrove swamp, and the animals do not risk going through the mud, they are only able to cross where the shores are sandy, and thus they

* H. N. Ridley, 'Nat. Science,' vol. viii. p. 188

† 'Fatigue,' pp. 22-3.

have regular starting and landing places."* The Jaguar (*Felis onca*) has been observed crossing the La Plata River by Lieut. Page.† Paul Fountain states that all the large Cat-like animals readily take to the water, "but it is quite the element of the Jaguar. I have never seen these animals far from the river, and a thickly wooded island in the midst of the stream is their favourite haunt."‡ In Africa, according to Mr. F. V. Kirby, "Leopards take to water very readily, and swim well. I once saw one swim across a river, a distance of fully thirty yards."§ In North America the Black Bear was seen by Hearne swimming for hours with widely open mouth, thus catching, almost like a Whale, insects in the water."||

Elephants are well-known swimmers. Dr. Schweinfurth relates that six Indian ones were sent by the Khedive Ismail from Cairo to the Sudān. They travelled the long distance of two thousand miles uninjured, "swimming the Nile six times."¶ Sir S. Baker saw Elephants cross the Brahmaputra when the channel was about a mile in width.** Mr. Gould mentions a Kangaroo which swam for two miles through the sea, one mile being against a sharp wind and heavy waves.†† The Guanaco,

* 'Natural Science,' vol. vi. p. 89.—The Tiger is, however, absent from Ceylon, and has not crossed the narrow strait which separates that island from the mainland. Mr. Hornaday thus accounts for its absence:—"It certainly was not the width of the strait which hindered its immigration, and the inhabitants of Ceylon have to thank their lucky stars that the two long arms which in reality connect the island and the peninsula are barren wastes of sand instead of being covered with thick jungle. Had there been sufficient vegetation upon them to afford cover for the Tiger, or encourage his migration, there is no doubt that the island would now be infested by these dangerous beasts" ('Two Years in the Jungle,' p. 252). Jungle, however, is not an absolute necessity for the Tiger as Mr. Hornaday's remarks might lead one to suppose. In the Himalayan regions its footprints are sometimes found impressed in the fields of snow, whilst it is also an inhabitant of the plains of Manchuria and the Amoor region, as well as of the plains lying north of the Hindu-Kush.

† Cf. Heilprin, 'Geogr. and Geol. Distr. Animals,' p. 42.

‡ 'The Great Mountains and Forests of S. America,' p. 63.

§ 'In Haunts of Wild Game,' p. 380.

|| Cf. Darwin, 'Origin of Species,' 6th edit. p. 141.

¶ Cf. note, 'Emin Pasha in Central Africa,' p. 390.

** 'Wild Beasts and their Ways,' vol. i. p. 48.

†† Cf. 'Bush Wanderings of a Naturalist,' by an Old Bushman, p. 4.

or Wild Llama, as observed by Darwin in Patagonia, is described as readily taking to the water; "several times at Port Valdes they were seen swimming from island to island."* Brehm heard from eye-witnesses that to the American Bison, when migrating, "a stream a mile wide is to them no barrier, scarcely even a hindrance."† The male Moose, in rutting time, swims from island to island, in the lakes and rivers of North America, in pursuit of the females.‡ As our late contributor, the Rev. H. A. Macpherson, affirmed, Deer swim very well, whether in salt water or fresh, and will keep the sea for over an hour if it is calm, and for more than half that time even if it is rough. "Du Fouilloux says he has known of Deer driven to sea by hounds, being taken thirty miles out by fishermen." Pliny credits Stags with swimming thirty leagues.§ The Martindale Stags occasionally swim the breadth of Ulleswater Lake in order to join the hinds in Gowbarrow Park. Stags have also been found to cross from Gowbarrow to the shores of Martindale, but this is an unusual event.|| On the Purus, in South America, Deer swim gracefully and well, both in the river and in the lake. On one occasion Paul Fountain saw two Jaguars attempt to intercept some of them that were swimming towards the bank of the lake. The Deer saw them, and changed their direction, and, though the Jaguars galloped round the lake, the Deer were too quick for them, and escaped.¶

Bates saw a Three-toed Sloth (*Bradypus tridactylus*) swim a river about five hundred yards wide. Even Armadillos "are said to be able to swim well and swiftly."** Dr. Leith Adams states that the Canada Lynx (*Felis canadensis*) is well known to be an expert swimmer, and preys on Trout and small fishes.†† The Mole (*Talpa europaea*) has been seen swimming across the Trent where it is about two hundred yards wide, and the Hedgehog (*Erinaceus europaeus*) has been known to swim a pond of

* 'Journal of Researches,' &c., edit. 1890, p. 158.

† 'From North Pole to Equator,' p. 242.

‡ Cf. Gilbert White, 'Nat. Hist. Selborne,' Harting's edit. p. 98.

§ 'Red Deer,' p. 244.

|| *Ibid.* p. 24.

¶ 'The Great Mountains and Forests of S. America,' pp. 81, 82.

** Cf. 'Roy. Nat. Hist.' vol. iii. p. 217.

†† 'Nat. Nile Valley and Malta,' p. 33.

some eighteen or twenty yards from bank to bank.* The Mole has also been described as swimming across a Broadland river, "its little pink snout raised just above the surface."† Mr. Emerson, another Broadland observer, states that "Marsh-mice can swim; and, as the Water-Vole swims faster than a Rat, so the Marsh-Vole swims faster than a Field-Mouse. Pike and Herons sometimes take them on their journeys to and fro 'athwart the deeks.'"‡ According to Brehm, in Siberia migratory Squirrels found the rushing Tchussoveia no obstacle, for all that reached the bank of that rapid mountain river plunged without hesitation into its whirling and seething waters, and swam deeply sunk and with their tails laid across their backs to the opposite bank.§ Lemmings "swim across rivers, and even across broad lakes, arms of the sea, and fjords."|| Campbell says "they swim rivers, and Trout eat them, for I have several times cut freshly-swallowed 'Lemens' and Mice out of Trout which took my flies in the Alten."¶

Yarrell has recorded having seen a Hare voluntarily take to the water, and swim across a harbour a mile wide.** Emerson writes that Hares take to the sea if pressed, as also to the broads and rivers, when the harriers are close upon them.†† Jesse relates, on the authority of an angling friend for whose accuracy he can vouch, that one morning while angling for Trout he suddenly heard a great splash, and found it was caused by a Hare which had jumped from the bank to swim the river. Mr. Marshall, the angler, threw his fly over her, hooked her on the fur of her back, and *comfortably* landed her.††† Mr. Lydekker has even seen a Common Rabbit (*Lepus cuniculus*), when startled by his Dog on the margin of a river, plunge into the water, and reach the opposite bank in safety. §§

* Max Peacock, 'The Naturalist,' 1901, p. 44.

† W. A. Dutt, 'The Norfolk Broads,' p. 127.

‡ 'Birds, Beasts, and Fishes of the Norfolk Broadland,' p. 331.

§ 'From North Pole to Equator,' p. 254.

|| *Ibid.* p. 255.

¶ 'Frost and Fire,' vol. i. p. 271.

** Loudon's Mag. Nat. Hist.' vol. v. p. 99.

†† 'Birds, Beasts, and Fishes of the Norfolk Broadland,' p. 329.

††† 'An Angler's Rambles,' p. 19.

§§ 'Roy. Nat. Hist.' vol. iii. p. 198.—R. L. Stevenson, in the South Sea

Most men in a natural condition can swim, but records principally appertain to their feats in the sea. There are some narratives of their fluviatile journeys, and perhaps one of the best to instance is that given by Paul Fountain : "The Indians take long journeys through the forest, swimming the broadest rivers with great facility, setting at naught the danger from lurking Caymans, and simply using a small log of wood as support or float. Some few tribes do use what is called in Guiana a 'wood-skin,' a kind of shallow bark canoe ; but this habit seems to be so exceptional and local that at this time I had not heard of it, and supposed all the Indian tribes to be ignorant of the use of canoes."*

We may now leave mammals, and turn our attention to land-birds, apparently most unlikely subjects to develop natatory habits. The instances to be given are very few, but are sufficient to indicate that the practice cannot be considered as unique. Mr. Cronwright Schreiner has known Ostriches to swim some distance down the Great Fish River when it was running fairly strong, and heard on good authority of a cock that was carried a long way down the same river when it was running nearly level with its precipitous banks in the stormy season ; he was some hours in the water before he could get out, but he emerged unhurt.† Pheasants will occasionally take to water. A young bird has been seen to swim across a pond about eighteen or nineteen feet wide in following its mother which had flown over the same. A cock Pheasant has been observed to swim across the River Usk where it was thirty yards broad, and running at the rate of four knots an hour. "When wounded and dropped into the water, Pheasants swim with facility, and some instances are on record of their diving beneath the surface and rising at some distance."‡

Islands, has known one of the native Pigs to leap overboard, swim five hundred yards to shore, and return to the house of his original owner ('In the South Seas,' p. 91).

* 'The Great Mountains and Forests of South America,' p. 41.

† 'Zoologist,' ser. 4, vol. i. p. 104.—"Even as a chick the Ostrich is a powerful swimmer."

‡ Cf. Tegetmeier, 'Pheasants, their Nat. Hist. and Pract. Management,' pp. 11, 12.

Most reptiles can swim. Dr. Leighton has recently made some remarks on British species. "It has long been a matter of dispute and doubt whether the British Adder (*Vipera berus*) ever took to the water as a matter of ordinary habit. Most ophiologists denied this, or at any rate had not observed it. Years of observation in English counties had failed to bring forward a single case, but the result of some correspondence indicated that in Scotland the habit was not unusual. Investigations and experiments with Adders in the Scottish Highlands proved that in that district Adders were in the habit of swimming the streams and rivers, a habit which has become incorporated in some of the folklore of the Highlands."* This again indicates that we have a paucity of observations relating to the swimming of many reptiles.

Even insects of non-aquatic habits swim. Mr. Jas. Hudson, in a paper recently read before the Royal Horticultural Society on the cultivation of Water Lilies, states that Aphides are troublesome to Nymphæas, and that these insects appear to have accommodated themselves to the situation, and acquired the art of swimming.

We have only given examples of an animal practice, which is probably of almost universal application when necessity occurs, but which at the same time is one little recorded as regards non-aquatic species. In one sense it exhibits the inheritance of an acquired habit. All mammals can swim, but few persistently exhibit the acquirement. Pursued by enemies, and accidentally immersed or borne away by floods, must have been the experience of many animals, some of which succumbed, while others survived by natatorial capacity. Thus in time, though rivers still remained mighty, they were no longer complete barriers to the dispersal of land animals, and therefore, though the aggregate of a species may be focused on one side of the stream, its migratory representatives may be distributed over a considerable area from the opposite bank.

* British Association Rept., Sect. D. Southport, 1903.

NOTES AND QUERIES.

MAMMALIA.

Pigmy Shrew (*Sorex minutus*) at Rainworth.—A Cat brought one of these little animals into the house a short time back, and from what I hear this is the first time it has been recorded for the county.—**J. WHITAKER** (Rainworth, Notts).

Colour Variety of the Common Mole (*Talpa europaea*).—I have in my collection a pretty colour variety of the Mole, which I think is worth recording, as it is uncommon. The colour is an iridescent "mouse-grey" (description from Ridgway's 'Nomenclature of Colours'). The fur is somewhat coarse, and has not the soft feel of the ordinary Mole. The specimen was taken at Milford, Surrey, in May, 1902.—**GORDON DALGLIESH** (29, Larkfield Road, Richmond, Surrey).

Winter Whitening of the Stoat in Britain.—There seems to be some evidence that winter whitening, when it takes place in the Stoat in Britain, is more prevalent amongst females and males of less than average size than amongst large males. If any naturalist can kindly add to the evidence which I already possess upon this point I should be extremely grateful.—**GERALD H. BARRETT-HAMILTON** (Kilmanock House, Arthurstown, Ireland).

AVES.

Robin nesting in a Tree.—On March 28th last I saw a Robin (*Erithacus rubecula*) carrying nesting materials in the churchyard here, and watched it to its nest, which was in the top of a young cypress tree. The tree is a thick and luxuriant one, about seven feet high, and stands close to the edge of a path, and about fifteen yards from a side door of the church. The nest was in the centre of the top, between the two leading stems, and nearly five feet from the ground. It was well concealed by the thick fronds of the cypress, but fully exposed to the action of the wind, which causes the tree to sway considerably. The nest was completed a few days later, but was unfortunately destroyed before eggs had been laid. The village youngsters search the trees in the churchyard for nests, and it is rarely that one can

escape their prying eyes. I have never before known a Robin to build among the leaves of a tree or bush, in a situation similar to that of a Blackbird's or Greenfinch's nest. Can anyone tell of a similar instance?—ALLAN ELLISON (Watton at Stone, Herts).

[A few years ago a Robin built in a high hedge at the bottom of my garden on the Surrey hills. The egg of a Cuckoo was also deposited in this nest. The Cats which destroyed all the young nesting birds did not spare this interesting family.—ED.]

Crossbill in West Suffolk.—A male Crossbill (*Loxia curvirostra*) was unfortunately shot near Bury St. Edmunds on March 31st by a schoolboy gunner, from whom a mutual friend kindly begged it for me. From the *post-mortem* examination I have little doubt but that it was one of a pair of breeding birds. It is in orange-red plumage, with bright yellowish-green feathers appearing here and there, and, having carefully inspected these green feathers with the aid of a powerful glass, they appear to be the beginning of a new plumage rather than the last of an old one. It will be remembered that the male of the pair of Crossbills now exhibited, with their nest and eggs, in the National Collection, which the donor has fully described in this Journal (1889, p. 181), is a yellow-green bird.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

Observations on the nesting of Rooks.—For some days past I have been watching the efforts of a pair of Rooks (*Corvus frugilegus*) to establish a nest in a small plantation situated a few hundred yards from a colony of about forty nests. As soon as the nest is about half-finished, a raiding party, consisting usually of about six Rooks, comes up and demolishes it. Sometimes a single bird will come, and then the aggrieved pair give battle, but on the arrival of reinforcements they retire from the struggle. Another couple started building operations in an adjoining tree, but, curiously enough, the marauders have so far taken no notice of them, though they still continue to harass the original pioneers. I have been speculating as to the cause of the unpopularity of these latter. Are they the leaders of a revolt from the main body, or newcomers into the neighbourhood, or are they a weak couple that can be robbed with impunity? Can any of your readers who have studied the habits of Rooks supply any other explanation? At the time of writing the nest is about half-finished, but a rowdy crew keeps coming up to see how things are going on, and one or two scowling sentinels remain on duty, evidently to report progress.—R. H. RAMSBOTHAM (Elmhurst, Garstang).

Hoopoe at Beachy Head.—A relation of mine, living at Eastbourne, has just sent me the enclosed “cutting”; she went at once to see the bird, but found that it had died soon after capture, and had been sent to be stuffed. If it had not escaped from confinement, it is an interesting occurrence. Bird died twenty-four hours after capture.—
D. A. BANNERMAN (Guildford).

“On Thursday, April 21st, 1904, Mr. Marcus Uzielli, a gentleman staying at Granville Hill, was riding on the downs with a friend (Mr. Maurice Stammers), when a strange-looking bird was seen flying slowly near the ground. Mr. Uzielli dismounted, and went in pursuit of the bird, which, being in an evidently distressed state through long exercise on the wing, was soon caught. Inquiry quickly revealed that the bird was a specimen of the Hoopoe (*Upupa epops*), whose appearance in this region is said to be extremely rare. We are informed, in fact, that one has not been caught in Sussex for a good many years. The presumption is that this particular bird had strayed, and had crossed the Channel. The specimen captured by Mr. Uzielli, who hopes to preserve it alive, may be seen at the premises of Mr. Cameron P. Cummings, naturalist, 19, Terminus Road.”

Appearance of Cuckoo.—On April 7th last I put up a Cuckoo out of a small bushy hollow on the downs near Swanage, Dorset. The bird was very weak on the wing, and settled again in the next field.—
BERNARD B. RIVIERE (Flaxley, 82, Finchley Road, N.W.).

Kestrel (*Falco tinnunculus*) laying in an artificial Nesting-box at Rainworth Lodge.—I have six boxes here for Stock-Doves to breed in. Three are made of poplar trees hollowed out and boarded at each end, a hole being left for the bird to get in; they are placed on the arms of two oak and a sycamore, and bound on with wire; the bark is left on, and they are very attractive to Stock-Doves. All these have at the present time nests in. The other three are simply deal boxes, and in one of these, which is fixed up about 25 ft. high in a Scotch fir, the Kestrel is now nesting. We have noticed them hanging about since February, and lately they have been seen to go into the box, which is about 2 ft. by 18 in. deep. As I passed the tree the other night, I gave it a tap with my stick, when out came the Kestrel. This afternoon (April 28th) it did so again. A long ladder was got, and my son went up and found five eggs in the box, the Stock-Dove nest of last year being used. They are a very beautiful clutch, and having been laid in such a curious place makes them of great interest to us. We have many different birds nesting in boxes here, but this is the first time a Hawk has done so, nor have I ever heard of such a case. The tree stands,

with others, about two hundred and fifty yards from the house, on a bank on the side of the Deer-paddock here.—J. WHITAKER (Rainworth, Notts).

Gadwall in Hants.—It may interest Mr. G. B. Corbin and others who study Hampshire ornithology to know that a number of pinioned Gadwall have been turned out on the Beaulieu Manor, in the hope that these birds may become established in the county in the same way that has been done in Norfolk. I trust that sportsmen on the neighbouring estates will give them a chance. When once seen they are easily recognized on the wing even at some distance, and, if flushed close by, the white speculum is unmistakable.—HEATLEY NOBLE (Temple Combe, Henley-on-Thames).

Kentish Plover (*Aegialitis cantiana*) at Rainworth.—On April 13th my son saw a small Plover running about in a young wheat-field on the side of one of the ponds here, and on getting up to it under the cover of a hedge—which he did within fifteen yards—and focusing his glasses on it, found it was a bird of this species, and, having seen many of them when nesting in Holland, there was no possible mistake. The bird then flew a short distance, uttering its call, which is quite different to the Ringed Plover. It settled again, and began to look for food. He watched it for some time. Again later in the day he saw it, and was for many minutes within easy distance; so he had every opportunity of being quite certain about it. This is a new species for Notts, and it is rather remarkable to have been able to add a new bird and a new animal in one week, but here someone is always on the look-out.—J. WHITAKER (Rainworth, Notts).

Little Gull (*Larus minutus*) on the Mersey.—On Dec. 16th, 1903, my friend the Rev. W. B. Tracy noticed a single Little Gull in winter plumage amongst other Gulls around the Conway.—F. C. R. JOURDAIN (Clifton Vicarage, Ashburne, Derbyshire).

Great Crested Grebe in Richmond Park.—A pair of *Podiceps cristatus*, which I believe have nested on the Penn Ponds, Richmond Park, for the last few years, have arrived again this spring. I first noticed them on the 17th of this month (April). One of the birds is in full summer plumage, the other is still in winter dress. On March 27th I noticed a number of Scaup and Pochards on the Penn Ponds, but they have now left. I heard the Wryneck in Richmond Park on the 17th for the first time this year.—GORDON DALGLIESH (29, Larkfield Road, Richmond, Surrey).

Early nesting, &c., of Little Grebe (*Podicipes fluviatilis*).—A river-keeper, upon whose word strict reliance may be placed, has just told me that he saw a nest of the Little Grebe, containing four fresh eggs, on March 10th, which, as far as my experience goes, is a very early date for such an occurrence. A gentleman, when Salmon-fishing a few weeks ago, detected some white object upon a quantity of river-weeds, and on closer acquaintance saw it was the silvery breast of a Grebe, the bird having been choked in its attempt to swallow a Bullhead (*Cottus gobio*). He brought the bird to me with the fish (which was full of spawn) stuck fast in its gullet, supposing such a case unique; but I assured him it was a fact comparatively well known, and that three or four similar instances had come under my own observation. Being the commonest of its class, and a "resident" species, what lover of the feathered tribes but has watched with pleasure the interesting movements of this expert little bird, which, when feeding unmolested, swims and dives near the same spot with a business-like regularity, but if disturbed dives, and often disappears in a most marvellous manner. It was formerly much commoner on the Avon than it has been of late years, and was often caught in the fisherman's nets; on one occasion, when dragging the net for Roach, no fewer than three of the birds were taken in one day by this means. I knew an old birdcatcher who used always to eat the Little Grebe when he could get it, and he once told me it was very good either stewed or roast; tastes differ, but the natural smell of the species, together with the flabby and oily condition of the flesh, never seemed to recommend it as a very toothsome morsel.

G. B. COREIN (Ringwood, Hants).

Nesting Notes.—On March 12th a Wild Duck was sitting on eleven eggs in a gorse-field near Stanmore, Middlesex. On April 20th a pair of Buzzards had three eggs, and a pair of Ravens five young in the nest, nearly ready to fly (Devon).—BERNARD B. RIVIERE (Flaxley, 82, Finchley Road, N.W.).

NOTICES OF NEW BOOKS.

The Natural History of Sokotra and Abd-el-Kuri, being the Report upon the Results of the Conjoint Expedition to these Islands in 1898-9. By Mr. W. R. OGILVIE-GRANT, of the British Museum, and Dr. H. O. FORBES, of the Liverpool Museums, &c. Liverpool : The Free Public Museums.

THERE is always an importance and charm in the delineation of insular faunas, and there is no lack of interest to the naturalist in this large volume. The Sokotran Archipelago, as described by the Editor, Dr. Forbes, or the summits of the larger islands, at all events, "are now known to be among the land surfaces of the globe that have longest, if not always, held their heads above the sea, their sculptured peaks and pinnacles attesting to the waste and wear they have so long endured. They have been mute witnesses probably since earliest Palæozoic times to the drowning of many lands around them, and to the uplifting from the ocean of mighty ranges on the two continents towards which they now look, and of which at one time or another in their wonderful vicissitudes they have formed a part." This expedition was distinctly a success, large collections were made, and the fauna and flora is monographed by a number of naturalists who are mostly all acknowledged authorities upon their subjects.

The mammals of Sokotra, so far as known, comprise eleven species; the African Ass (*Equus asinus*) is found in a wild condition, and has probably thus lived for "some thousands of years." Fifty species of birds were collected, ten from Abd-el-Kuri, and forty from Sokotra; these comprised eight new species, though some recorded by previous investigators were not found by this expedition. The avian enumeration contains many bionomical observations, and a musical representation of call-notes. Of the Reptiles, beyond the results of former expeditions, six new species were discovered, one referable to a new genus. The apparent complete absence of Batrachians from Sokotra is

one of the remarkable features to which Mr. Boulenger has drawn attention. The invertebrates, as might be expected, are very largely represented, but our space forbids an adequate reference; while botanists will find an authoritative enumeration of the flora.

This volume should find a place on all biological shelves; to the zoo-geographer its importance requires no insistence, and the many specialists who have contributed to the compilation compel its consultation by most zoologists. It is well illustrated by a number of coloured plates, and constitutes one of those books much endeared to naturalists—a work of reference to a small but very complex fauna, which, particularly as regards the invertebrates, is the better worked as the knowledge of the specialist is familiar with the fauna of a far wider area.

Controverses Transformistes. Par ALFRED GIARD. Paris: C. Naud.

UNDER the above title, Prof. Giard has republished some communications he has contributed on evolutionary subjects, which have appeared in different scientific publications. The first, and one which is of the most general interest, is entitled "Histoire du Transformisme—Buffon, Lamarck, Darwin," and is not only of historical importance, but reaffirms, what is so often forgotten, that the doctrine of evolution is not modern in conception, but only in application; that not only has the teachings of evolutionary biology permeated and profoundly affected all other realms of human thought, but that the suggestions of past thinkers have largely assisted the formation of modern evolutionary conceptions. The knowledge of evolution is, and always will be, the gradual unfolding of the cosmic process; the problem crops up in the weird questions and theories of ancient primitive races; its solution depends more upon scientific method than chance discovery, and will be synchronous with the mental evolution of man. When the process of evolution is thoroughly understood, the search for truth will be ended, and the obstinate questionings of man for ever disposed of.

Prof. Giard has well traced indications of the conception in the minds of many great French thinkers. Both Bossuet and Montesquieu affirmed that the mental condition of man and the

essence of his jurisprudence were largely affected by climatic conditions. Rousseau recognized the factor of heredity in man. Diderot advised the physician to abandon the *pourquoi*, and to occupy himself with the *comment*, thus in agreement with Goethe, who stated : "La question n'est plus, dit-il, de savoir pourquoi le Bœuf a des cornes, mais comment les cornes sont venues au Bœuf." Buffon, as is well known, advanced views which brought him under the censure of the Sorbonne, but, as Prof. Giard pertinently remarks, Buffon had not the temperament of a martyr. Of course, Geoffroy Saint-Hilaire and Lamarck have all consideration, and the author concludes his subject by reference "à l'édifice construit par trois grands génies, l'honneur de trois grands peuples, Goethe, Darwin et Lamarck!"

We have not space to refer to the other subjects dealt with in this book. The chapter devoted to "Convergence des Types par la vie Pélagique" is most invigorating to one who fails to see in every instance of concurrent evolution another capture for the net of "mimicry."

EDITORIAL GLEANINGS.

WE are indebted to the Editor and Proprietors of the 'African World' for the following particulars relating to the killing of Elephants in the Congo Free State, and for the use of the block illustrating same. These appeared in their special "Congo" issue of April 16th.

CONGO IVORY. — The ivory market showed in 1903 an era of prosperity without precedent in the annals of this article. Not only is the figure of transactions of 356,350 kilos. greater than the quantities sold in 1902 by 34,000 kilos., and surpasses the average of the ten former years by 86,000 kilos., but the constant rise by which the article has benefited during the past year has continued with the same regularity, and reached about 10 per cent. at the end of 1903.

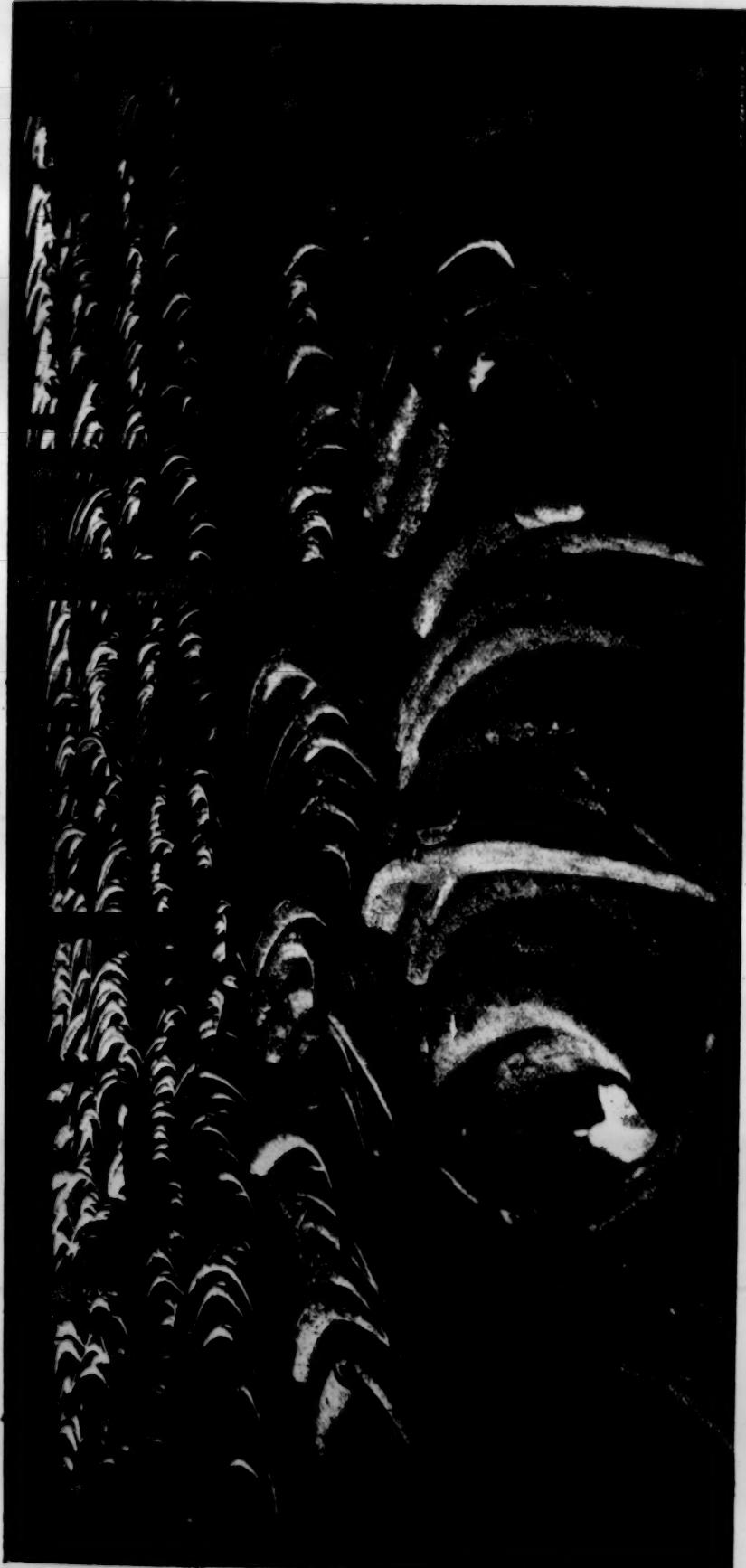
Elephant tusks of ordinary quality yield from 24 to 25 francs the kilo.; the *dents à bangle* (tusks for bracelets, i. e. tusks used for the rings worn by the Indians and by the natives of the East Coast of Africa), from 23 to 25½ francs; light tusks, 19¾ francs; small tusks, 16 francs; *dents à billes* tusks for billiard-balls, i. e. tusks very round and full, of 6 to 8 centimetres diameter), 30 francs; solid (*scrirailles*), 13½ to 15 francs; unsubstantial, about 13 francs. Soft ivory has been less abundant—18,600 kilos., against 22,700 kilos. sold last year—and generally of a more imperfect quality. The average realized is hereby affected, as will be seen from the following list.

The ordinary qualities yield 29 to 32 francs; *dents à billes*, 35 francs. The importation has, according to the annual list of MM. H. and G. Willaert, brokers, Antwerp, risen to about :—

354,500 kilos. and the total of the sales to 356,350 kilos.						
Against	70,000	"	"	322,300	"	in 1902
	27,000	"	"	312,000	"	1901
	338,000	"	"	336,000	"	1900
	328,000	"	"	292,500	"	1899
	231,900	"	"	205,300	"	1898
	265,000	"	"	281,000	"	1897
	200,000	"	"	265,700	"	1896
	362,000	"	"	274,500	"	1895
	264,000	"	"	186,000	"	1894
	224,000	"	"	224,000	"	1893
	118,000	"	"	118,000	"	1892
	59,500	"	"	59,500	"	1891
	77,500	"	"	77,500	"	1890
	46,600	"	"	46,600	"	1889
	6,400	"	"	6,400	"	1888

The stock amounts to 188,000 kilos.

CONGO IVORY AT ANTWERP.



Against 205,400 kilos. in 1902, 157,000 kilos. in 1901, 141,000 kilos. in 1900, 144,500 kilos. in 1899, 110,000 kilos. in 1898, 84,000 kilos. in 1897, 100,300 kilos. in 1896, 166,000 kilos. in 1895, 98,500 kilos. in 1894, 41,000 kilos. in 1893, 34,500 kilos. in 1892, 21,000 kilos. in 1891, 18,000 kilos. in 1890, 20,000 kilos. in 1889.

The 356,350½ kilos. sold last year were composed of :—

	K.	In 1902.	In 1901.	In 1900.	In 1899.	In 1898.
Congo, hard.....	240,443	against 215,819	222,745	237,607	207,355	131,500
Congo, soft	18,663½	" 22,731	15,395	12,427	12,571	8,000
Angola	68,032½	" 50,925½	20,385	46,004	53,240	58,000
Benguela, soft.....	—	" 192½	593	—	235	1,100
Senegal.....	5,381	" 5,302½	4,107	1,269	1,736	670
Gabon	9,400½	" 9,215½	18,721½	11,982	12,322	1,000
Abyssinie	42	" 135½	2,244	9,727	886	500
Mozambique	158	" 728	3,040	1,046	—	—
Ambrize	4,239	" 3,995½	6,850½	3,703	—	4,500
Cameroon	9,512½	" 13,088½	16,459	10,681	2,968	—
Zanzibar	—	" —	75	852	964	—
Siam	20	" —	32	149	—	30
Egypte	180	" —	1,153	—	—	—
Hippopotamus' teeth	204½	" 151	107½	340	223	—
Rhinoceros' horns	—	" —	—	22	—	—
Curiosities	124	" —	92½	200	—	—
 Kilos.	 356,350½	 322,284½	 312,000	 336,000	 292,500	 205,300

CONSUMPTION OF IVORY IN THE WORLD.

For.	England. Kilos.	America. Kilos.	Germany. Kilos.	France. Kilos.	Other Countries. Kilos.	Total Kilos.
Knife-handles	143,000	11,000	13,000	9,000	1,000	177,000
Piano-keys	14,000	62,000	57,000	29,000	—	162,000
Combs.....	16,000	21,000	23,000	31,000	—	91,000
Billiard-balls	9,000	13,000	12,000	14,000	1,000	49,000
Various	6,000	9,000	8,000	7,000	4,000	34,000
 Total	 188,000	 116,000	 113,000	 90,000	 6,000	 573,000
Consumption in India						121,000
Consumption in China						13,000
General annual total						647,000

The legislation of the Congo Free State with respect to ivory aims principally at three points; the regulation applied to Elephant hunting, with a view to preventing the extinction of these animals; the recognition of the principle in virtue of which the carcases of savage animals are considered as belonging to the proprietor of the grounds, and become part of his capital; and the free rights granted by the State to individuals for collecting ivory in the lands belonging to the State in different regions.





Fig. 1.—SPOONBILLS IN CONFINEMENT IN NORFOLK.

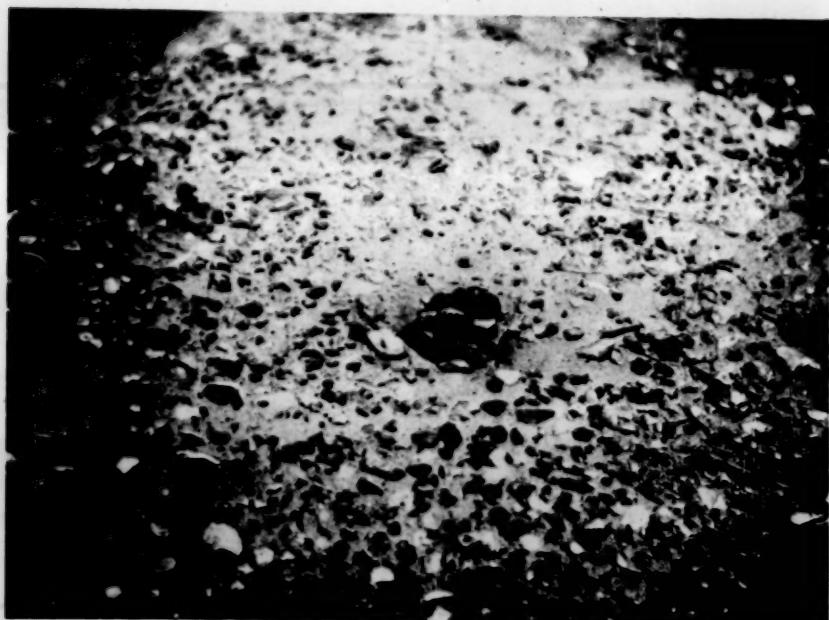


Fig. 2.—NESTLINGS OF *Sterna fluviatilis*.